# OBITUARY NOTICES.

## SIR HENRY CORT HAROLD CARPENTER.

### 1875—1940.

SIR HAROLD CARPENTER, Professor of Metallurgy at the Royal School of Mines, died of heart failure on September 13th during a walk in the neighbourhood of Swansea, his department having been transferred there for the duration of the war. Having reached the age of 65 his retirement was due, but he was continuing the work of teaching in the department directed by his former assistant and collaborator, Principal C. A. Edwards, F.R.S.

Carpenter was educated at Eastbourne College, and went to Oxford as a scholar of Merton. Here he gained a first in Natural Science, and in 1898, after graduating Ph.D. at Leipzig, went to Owens College, Manchester, as Research Fellow and Demonstrator in Chemistry. When the National Physical Laboratory was established in 1902 he was chosen to take charge of the work in chemistry and metallurgy. He now turned from organic chemistry to the study of metals, and although the department was a very small one, with little equipment, in the course of three years he carried out several researches of great importance. Chief amongst these was his determination, with B. F. E. Keeling, of the thermal equilibrium diagram of the alloys of iron and carbon. Allowing for the change in the thermometric scale and for the fact that the transformation of iron at about 1400° had not yet been recognised, the accuracy of this determination has been confirmed by the latest work, although in the meantime data from less careful workers had found their way into the text books. The alloys of copper and aluminium were studied in the same accurate way, and other investigations dealt with the heat treatment of high-speed tool steel and with certain complex alloys of iron. Altogether this was a remarkable output for such a young department, and a high standard was set for his successor, Dr. Rosenhain. In 1906 Carpenter was appointed to the chair of Metallurgy in the University of Manchester, and here he built up an important school of research. In 1914, however, he left to occupy the chair at the Royal School of Mines, which had been held by Percy, Roberts-Austen, and Gowland. The School of Mines having been particularly associated with process metallurgy—the smelting of metals—as well as with the metallographic side, Carpenter made a tour of large-scale metallurgical plants in America, with the object of gaining a first-hand acquaintance with the principal processes. His main interest, however, was in the structure and transformations of metallic alloys, and to this aspect of metallurgy his subsequent work was devoted.

While at Manchester, Carpenter's researches dealt mainly with equilibrium diagrams, chiefly of copper alloys, and with changes in solid solutions. At South Kensington he began a series of investigations, largely with the collaboration of Miss C. F. Elam, on the growth of crystal grains on annealing after deformation. This work led to the production of single crystals, first of aluminium and then of other metals, by applying a critical strain, followed by a controlled annealing, a method which proved most fruitful and opened up the field of research on the properties of single crystals of metals, the theoretical importance of which has proved to be immense. These studies, as well as one on the recrystallisation of electro-deposited iron, were illustrated by admirable photographs. Later, he gave much attention to the mode of separation of ferrite and pearlite from austenite during the cooling of steels, and in collaboration with Dr. J. M. Robertson added considerably to the knowledge of this phenomenon, of such industrial importance. Another series of papers dealt with the structure of native metals, and threw light on the processes of their formation.

Carpenter was a successful teacher, and also took a most active part in the organisation of metallurgical science. He was one of the founders of the Institute of Metals, and in due course occupied the presidential chair of that body and also of the Iron and Steel Institute and of the Institution of Mining and Metallurgy. His sound knowledge and courteous manner made him an excellent chairman, and his services to all these bodies were very great. His name is also particularly associated with the report of a Treasury Committee over which he presided, which was appointed to examine the conditions of professional appointments in the Civil Service, the " Carpenter Report " becoming the basis of the negotiations which continued over some years and resulted in a distinct improvement in the status and salaries of professional civil servants. In his later years he was frequently called on to advise government departments on technical matters.

Just before leaving London for Swansea, Sir Harold Carpenter had completed, in collaboration with Dr. J. M. Robertson, a comprehensive work on metallurgy. " Metals " is unlike any other text book in this field, the two large volumes being a highly readable account of the whole subject, from processes of extraction to the study of crystal structure. Only a very comprehensive knowledge made such a work possible, and the breadth of view shown in its writing is remarkable.

His services to metallurgy and to science in general brought him many honours. He became a Fellow of the Royal Society in 1918 and was knighted in 1929. The Universities of Wales and Sheffield conferred honorary doctorates on him, and he was a corresponding member of the Royal Swedish Academy of Science and an honorary member of the American Institute of Mining and Metallurgical Engineers. He was awarded both the Bessemer and the Carnegie Medal of the Iron and Steel Institute, the Institution of Mining and Metallurgy and the Thomas Turner Gold Medals, the Carl Lueg Gold Medal of the Verein deutscher Eisenhüttenleute, the Platinum Medal of the Institute of Metals, and, only a few months ago, the Honda Gold Medal of the Japanese Institute of Metals.

Carpenter's influence will be greatly missed. He had become the natural leader of the metallurgical profession in this country, and the school which he had formed influenced the development of the subject on the practical as well as on the academic side. His attractive personality played a great part in bringing about that influence, and he had many friends. A lover of the open air and of the mountains, it might have been expected that he would enjoy many years of comparative leisure after his retirement, and his death came as a shock. He is survived by Lady Carpenter, formerly Miss Ethel Lomas, and had no children.

C. H. DESCH.

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## ALEXANDER CHARLES CUMMING.

1880—1940.

ALEXANDER CHARLES CUMMING died suddenly on September 28th, 1940, after a strenuous life, the early part devoted to academic and the later to industrial work.

Born in Melbourne, Victoria, Cumming proceeded from Caulfield Grammar School to the University of Melbourne, where he gained several scholarships and graduated as B.Sc. with First Class Honours in Chemistry in 1902 and as D.Sc. in 1906. At the University he came under the inspiring influence of Professor (later Sir) D. Orme Masson and work upon carbonates, cyanides, cyanates and urea, as well as upon Congo-red and other indicators, was recorded in three contributions to the Society of Chemical Industry, Melbourne, in 1903 and one to the Chemical Society (J., 1903, **83**, 1391).

Awarded an 1851 Exhibition Scholarship in 1904, Cumming came to Dundee, where a life-long association with Professor (later Sir) James Walker began. The latter on his transference to Edinburgh in 1908 invited Cumming to join his staff as a lecturer.

Until he entered chemical industry, Cumming's interests were mainly concerned with analytical and with physical chemistry. In association with S. A. Kay was published " Quantitative Chemical Analysis " in 1913; six editions followed, the latest in 1939. Cumming's " Practical Chemistry for Medical Students " appeared in 1911 and two editions followed. He edited the English version of G. Lunge's classic books—" Sulphuric Acid and Alkali " and " The Technical Chemists' Handbook " and also edited a series of short " Chemical Monographs," the first of which appeared in 1913 and the latest in 1922.

To the Chemical Society he contributed, either alone or in collaboration with students, papers on malacone, zirconium silicate (J., 1908, **93**, 350); estimation of mercury (J., 1913, **103**, 1772), of zinc (*ibid.*, p. 1004), and of potassium (J., 1915, **107**, 361); vapour pressures (J., 1909, **95**, 1772). Other papers included amphoteric electrolytes (*Proc. Roy. Soc.*, 1906,

**78**, 105), basic copper nitrate (*Proc. Roy. Soc. Edin.*, 1911, **32**, 4), ferric iron reduction (*ibid.*, 1912, **32**, 12), silica plate (*ibid.*, p. 17), electrochemistry of lead (*Trans. Faraday Soc.*, 1907, **2**, 199), strong electrolytes (*ibid.*, p. 213), elimination of potential due to liquid contact (*ibid.*, 1912, **7**, 253), potential due to liquid contact (*ibid.*, 1913, **9**, 174), and Hempel double pipette (*J. Soc. Chem. Ind.*, 1913, **32**, 9).

The course of Cumming's career was entirely altered by the Great War. In a privately printed pamphlet " Starting a War Time Factory," Cumming wrote—" I did not know to whom I should apply, but decided to address a letter to Lord Kitchener, stating I was a trained chemist, that supplies of sulphuric acid and other requirements for making explosives were available in Edinburgh, and asking if my services in this connection would be of any use to the War Office." This letter led to an interview with Lord Moulton and thereafter to the establishment of a " T.N.T." factory in Edinburgh under the directorship of Sir James Walker, A. C. Cumming, and J. W. Romanes in 1915 and subsequently of a Government Factory outside the city in 1916. Only one of the three directors had had previous experience in a chemical factory—J. W. Romanes—and he still carries on the Lothian Chemical Company in Edinburgh, but not for the production of high explosives! The combined efforts of the three led to the production of " T.N.T." of the highest quality and in large quantities. From the Ministry of Munitions of War, Explosives Department, a letter dated November 15th, 1918, to the Manager, H.M. Factory, Craigleith, Edinburgh, contained the following statement with regard to the ultimate destination of nitrogen—" The figures are probably a record for the country and, as happily the war is now over, it does not appear as if they will ever be equalled." H.M. Factory, Craigleith, was immediately closed down and the neighbourhood has become a residential one. In recognition of his services Cumming received the appointment of O.B.E. in 1918.

At the end of the war the University of Edinburgh instituted a Lectureship in Technical Chemistry and Cumming received the appointment. The experience of industrial life during the war tempted him to forsake academic life and in 1921 he went to Liverpool as consultant to Macfie and Sons, Ltd., Sugar Refiners, and three years later he became Managing Director. He reorganised the factory and spent fourteen strenuous years there until its closing in 1938. While in Liverpool he started a small factory for the production of " Klarit," a decolorising carbon.

In recent years Cumming lived at Caldy, Cheshire, or at " Craigness," Glen Isla, Perthshire. He married Miss Blythe Knox of Aberdeen and is survived by her, two sons, and three daughters.

Gifted with much force of character, Cumming was outstanding as a capable and confident teacher, a hard worker, a good organiser, and, to those who knew him well, a constant and sympathetic friend.

He was elected a Fellow of the Chemical Society in 1910, of the Royal Society of Edinburgh in 1914, and of the Institute of Chemistry in 1917.

LEONARD DOBBIN.
JOHN E. MACKENZIE.

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## SIR ROBERT ABBOTT HADFIELD.

1858—1940.

SIR ROBERT HADFIELD, chairman of the famous steel firm bearing his name, died at his house on Kingston Hill on September 30th, in his 82nd year. Whilst his most important contribution to science was made as far back as 1882, he had throughout his long life occupied a foremost position as an industrialist and as one occupied in the application of science to industry. He was born at Attercliffe, Sheffield, on November 28th, 1858, and was educated at the Collegiate School, Sheffield, where he received some instruction in chemistry. This was encouraged by his father, Robert Hadfield, who was a pioneer in the production of steel castings. At the age of 16 he began work in the firm of Jonas, Meyer, and Colver, and after a few months entered his father's works. Here he was provided with a laboratory, and began the series of experiments which were to prove so fruitful. At the early age of 24 he was obliged, on account of the elder Hadfield's failing health, to take over the management of the business. The firm was then converted into a limited company, and while continuing the making of steel castings, was widened in scope, specialising also in the production of armaments.

Hadfield's interest in alloy steels was aroused by reading a pamphlet on the alloys of manganese, issued by the Terre Noire Company. It seemed possible that very hard alloys might be obtained if a suitable composition could be found. It was known that, as additions of manganese to steel were increased, the hardness also increased, but from 3% onwards the alloys were too brittle to be of use. Hadfield, however, was not satisfied with this result, and persevered with the investigation, finding that with further additions the brittleness became less, and at 12—13% an alloy was reached having properties which were unlike those of any steel so far obtained. Quenching in water softened instead of hardening it, and the comparatively soft metal became harder under abrasion, giving quite extraordinary resistance to wear. The new alloy, in spite of containing about 86% of iron, was non-magnetic. It proved to be much more important than the very hard alloy which was being sought for, and it soon found its way into engineering practice, being used for crushing machinery, dredger buckets, railway and tramway crossings, and in other situations exposed to severe abrasion. In the war of 1914—18 it found a new and extensive application in the form of the British protective helmets. The discovery was made in 1882, and the first full account of it was given in a paper read to the Institution of Civil Engineers in 1888. The comparative softness and non-magnetic character are now accounted for by the fact that manganese steel belongs to the austenitic class, with the iron retained in the gamma condition, but some of its properties are still anomalous.

Another element which seemed to offer promise of obtaining a hard alloy was silicon, and a systematic study of the influence of successive additions of silicon to iron and steel was made. An improved structural steel was one product of this research, but still more important was the discovery that with 3—4% of silicon, carbon being almost absent, an iron alloy was obtained with high electrical resistance and also very low hysteresis loss. These properties were studied by Sir William Barrett, and the full investigation was described in a paper to the Institution of Electrical Engineers by Barrett, Brown, and Hadfield. This alloy found an important application in the making of transformers, allowing of a great saving in weight. There were difficulties in the making of the steel and in its introduction into industry, so that it was about 21 years after its discovery that the new alloy was produced commercially for electrical purposes.

The plan of investigating systematically the effect of adding progressive quantities of an element to iron or steel, and of determining as many properties as possible of the resulting alloys, was followed by Hadfield in studies of nickel, aluminium, chromium, and tungsten steels. The information thus obtained has proved of value, but no new alloy of outstanding properties resulted.

The direction of a great industrial undertaking came to occupy his time to an ever increasing extent, but Hadfield was an exceptionally hard worker, capable of keeping many lines of work going simultaneously, and his interest in metallurgical investigation never flagged. He was able to interest scientific investigators in the problems of the steel industry, and supplied them with material for the application of such special techniques as they had developed in their own laboratories. A striking example is that of the effect of very low temperatures on metals. Taking advantage of the equipment of the Royal Institution and of the Cryogenic Laboratory at Leyden, he collaborated with Sir James Dewar and later with Prof. Kammerlingh Onnes and with Prof. de Haas in research at temperatures extending even to that of liquid hydrogen. It proved that, whilst most steels become stronger at very low temperatures but lose their ductility, certain alloy steels increase in strength without any loss of ductility, in one instance even with a marked increase. Moreover, a relation between the behaviour of the two classes and their crystal structure was established.

Another investigation dealt with the production of ingots in which the unsound region due to contraction during freezing was reduced to the smallest possible volume in the upper portion. A new method of revealing segregation by pouring molten copper into the mould after it was filled was introduced, and a joint paper with Dr. Burgess of Washington described practical results in the use of the improvements in casting practice which had been suggested.

The corrosion of iron and steel was a subject on which Hadfield wrote much with the aim of arousing metallurgical opinion on the economic loss sustained from this cause. Apart, however, from the costly stainless steels, no structural steel has yet been obtained which does not owe its resistance to corrosion to the coating of paint or other protective layer which has been applied to it. Experimental work on corrosion by means of exposure tests under service conditions were encouraged by Hadfield, especially in regard to prolonged tests under marine conditions.

He also took a keen interest in the history of iron and steel metallurgy, and besides making a collection of old metallurgical books, examined and described a number of ancient iron objects, including the famous Pillar of Delhi. He obtained permission to make a minute study of the series of alloys of iron prepared by Faraday and preserved at the Royal Institution. A detailed account of this work was published in book form in 1931. Another work, on " Metallurgy and its Influence on Modern Progress," had been published in 1925.

Sir Robert Hadfield was knighted in 1908 and received a baronetcy in 1917. The list of honours which he received was a long one, many institutions at home and abroad having conferred on him honorary membership and awarded him medals. He became F.R.S. in 1909, and joined the Chemical Society in 1916. He was President of the Iron and Steel Institute in 1905—1907 and of the Faraday Society from 1913 until 1920, and members of those bodies will long remember his active interest in their proceedings and his lavish hospitality. He was Master Cutler of Sheffield in 1899—1900, being the second of his family to hold that office, and he was a generous benefactor to the University of Sheffield, taking a keen interest in the work of the metallurgical department. He also gave much consideration to economic questions, and shortly after the last war he proposed and strongly advocated a scheme for an Empire Development Board.

To the outside world he was better known than any other metallurgist, and his striking personality and capacity for making friends, coupled with his incessant activity as a writer and a correspondent, made his circle of acquaintances and colleagues, both at home and abroad, exceptionally wide.

Lady Hadfield, who survives him, was formerly Miss Frances Bett Wickersham, of Philadelphia, and was created C.B.E. in 1918 in recognition of the admirable work which she did in the hospital founded by herself and her husband at Wimereux. During the present war the Hadfield-Spears Ambulance rendered similar services in France.

C. H. DESCH.

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## EDWARD WILLIAM LUCAS.

1864—1940.

EDWARD WILLIAM LUCAS, whose death occurred suddenly at his house in Ealing on September 16th, 1940, was born at Ashbourne, Derbyshire, in 1864.

He received his general education at Derby Grammar School and after leaving school entered the School of the Pharmaceutical Society, qualifying as a Pharmaceutical Chemist in 1888.

He then entered the services of Messrs. John Bell and Co., Pharmaceutical Chemists of Oxford Street. From 1889 to 1893 he was employed in the Government Laboratory at Hong Kong, and then returned to London to take charge of the laboratory of John Bell and Co. Ten years later he was taken into partnership by the proprietor, Walter Hills, F.C.S., and from this firm sprang two limited companies: John Bell and Croyden, Ltd., of which he was a director for some years, and John Bell, Hills, and Lucas, Ltd., Manufacturing Chemists and Druggists, of which he was co-managing director with J. Stuart Hills till 1930, when he retired from active work, but retained a seat on the Board of Directors.

From 1896 to 1899 he was a member of the Board of Examiners of the Pharmaceutical Society. In 1903 he was elected a Fellow of the Institute of Chemistry and in 1905 a Fellow of the Chemical Society. He was a member of the British Pharmacopœia Reference

Committee and author of " Practical Pharmacy," " The Book of Prescriptions," and joint author of " The Book of Receipts," and " The Book of the Pharmacopœias."

The honour of C.B.E. was conferred upon him in 1918 in recognition of his work in the production of anti-gas respirators in the Great War.

He was a man of wide interests, who had engaged in many hobbies ranging from cycling in his youth to woodworking in his later years. He was also a great reader and possessed a remarkably retentive memory. He was essentially a virile man of action, enthusiastic to a degree upon the latest idea that roused his interest and quick to dismiss it, if it failed to realise his expectation. A very rapid worker, he was possessed of something akin to intuition, which often led him by short-cuts to correct results in chemical and other problems. Though prone to occasional outbursts, he was kind at heart, sympathetic and loyal; indeed a man who held the true affection of all who knew him well.

He leaves a widow, one son and one daughter and many friends to mourn his loss.

J. STUART HILLS.

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## CHRISTOPHER RAWSON.

### 1860—1940.

CHRISTOPHER RAWSON, who died in Manchester on May 29th at the age of 80, was elected a Fellow of the Society in 1880. He was one of the few remaining founder members of the Society of Chemical Industry, and one of the two surviving founders of the Society of Dyers and Colourists, of which he was the first Secretary, and of whose *Journal* he was for some years joint editor with Knecht.

Rawson was born in Bradford, one of a family of nine. In 1877 he entered the Royal College of Chemistry, where he studied chemistry under Frankland. After four years as Assistant to the Professor of Chemistry at the Royal Agricultural College, Cirencester, he returned to Bradford, where he later established himself as a consulting chemist.

In 1898 he was invited by the Behar Indigo Planters Association to examine and if possible improve the methods of cultivation and production of indigo in Bengal; the recent introduction of synthetic indigo was already threatening the existence of the natural product. Rawson's reports contained important suggestions for improvements, but he concluded that further efficiency in production must be gained by the application of genetics or by the introduction of varieties of plants with a higher indigotin content. After the Behar planters had decided to discontinue research work, Rawson joined the Badische Anilin und Soda Fabrik and travelled on behalf of this firm in the United States and Persia. In 1912 he was appointed Chief Chemist to the British Cotton and Wool Dyers Association Limited, Manchester, and later became a Director of the Company.

Rawson wrote authoritatively on the manufacture of natural indigo, and the application of the natural and the synthetic product. " A Manual of Dyeing," by Knecht, Rawson, and Loewenthal, was for many years the standard text-book on the subject, and passed through several editions.

Rawson was during his generation one of the best known and most highly respected chemists in the textile industry in the North of England. He had a quiet, gentle manner, and a kindly disposition, a feature of which was his readiness to help younger chemists and to assist in the organisation and improvement of the profession of chemistry—for some time he was Chairman of the Yorkshire Section of the Society of Chemical Industry, and he was one of a number of textile chemists in Manchester whose activities contributed to the founding of the British Association of Chemists. The Worshipful Company of Dyers elected him a Liveryman of the Company.

He was buried at the Southern Cemetery, Manchester, on June 1st, 1940.

F. SCHOLEFIELD.

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## NORMAN THOMAS MORTIMER WILSMORE.

### 1868—1940.

NORMAN THOMAS MORTIMER WILSMORE, who retired from the Chair of Chemistry in the University of Western Australia at the end of 1937, died at Claremont, W.A., on June 12th, after a brief illness. He was in his 73rd year.

Wilsmore was born at Williamstown, Victoria, Australia, in 1868. After preliminary schooling, he entered Melbourne University in 1887. He took a science course and graduated in 1890. From this time to 1892 he was engaged in chemical research and consulting work under Professor (later Sir) David Orme Masson. In 1892 he obtained the degree of Master of Science and in 1907 was awarded the D.Sc.

Leaving Australia in 1894, Wilsmore proceeded to University College, London, where for three years he was engaged in research work under Professors William Ramsay and Norman Collie. In 1897 he went to Göttingen primarily to study physical chemistry under Nernst. He also took some special courses in chemistry, physics, and electrical engineering. Four years later he removed to Zurich for the purpose of making a further study of technical chemistry. Shortly after his arrival there he was appointed first assistant in the department of physical and electrochemistry in the Federal Polytechnic under Professor Richard Lorenz. In 1903 he returned to University College, London, as assistant in chemistry. Subsequently he was promoted to be Assistant-Professor. This post he held until the end of 1912, when he left England to take up the Australian appointment. During the period 1903—1912 Wilsmore did valuable work in the teaching of chemistry (particularly physical chemistry) at University College.

In 1911 the University of Western Australia was established by Parliament and in the following year applications were called for the original teaching appointments. Wilsmore was appointed to the Chair of Chemistry. Before he left England, the Chair of Physical Chemistry at Liverpool became vacant in consequence of Professor F. G. Donnan's removal from Liverpool to University College, London, as successor to Sir William Ramsay. The Liverpool Chair was offered to Wilsmore, but he was unable to accept it, as he had already accepted the Australian Chair.

Arriving in Perth, W.A., early in 1913, Wilsmore with other newly-appointed members of the staff commenced the work of drafting regulations and preparing empty rooms to serve the purpose of lecture rooms. The primitive conditions of the Chemistry (and other) Departments improved but slowly, the expected improvements being checked mainly by the War (1914—1918) and financial depression (1931). It was not until near the end of 1935 that permanent Chemistry buildings were opened.

From 1894 to 1897 Wilsmore engaged in research work under Collie and jointly they published an account of the condensation of dehydracetic acid (which Collie at the time was investigating) with naphthalene and *iso*quinoline derivatives. In Göttingen he determined the electrode potentials of 31 metals with reference to the hydrogen electrode as standard. This was published in the *Zeitschrift für physikalische Chemie* and immediately following it was a criticism by Ostwald, who considered the calomel electrode to be preferable. A short time later a joint paper by Wilsmore and Ostwald was published, Wilsmore upholding the hydrogen electrode, especially with acid or alkaline electrolytes, and Ostwald the calomel electrode, the value for which was based on electro-capillarity and so more likely to give a true zero. It must be added that whilst in modern practice the calomel electrode is generally used, the values are usually referred to the hydrogen electrode as recommended by Wilsmore. Wilsmore's work on electrodes was continued after his return to London, where he made improvements in the zinc and cadmium amalgam electrodes. His last paper (1908) on this subject described the determination of electrode potentials in liquid ammonia.

Wilsmore's work on keten was carried out at University College, London. The investigation commenced with the discovery (1907) of keten itself, the simplest member of a group of compounds already known. Two later contributions to the chemistry of keten dealt with its properties, especially its polymerisation to " diketen " and the constitution of this substance. These investigations mark the termination of his original work (1910). It is particularly interesting to note that keten and diketen have recently become materials of industrial importance.

After his removal to Western Australia Wilsmore found no opportunities for research. Departmental improvements advanced exceedingly slowly. From about 1920 until almost the time of his retirement, laboratory facilities were limited to those necessary for students ; and in addition, the necessary literature and time for research were not available. The burden of teaching and administrative work alone was a serious hindrance to laboratory investigation, had that been otherwise possible.

During Wilsmore's tenure of the Chair of Chemistry (1913—1937) he had only one break in University work, *viz.*, during the War, January, 1917, to April, 1919, when he was engaged on important and valuable work in London with the Department of Explosives Supply. His retirement from the Chair took place at the end of 1937 when he reached the age limit. From that time until a few weeks before his death he was engaged privately in research work.

Wilsmore rendered much effective service to scientific organisations in Australia. For a period of several years terminated by his death, he was an active member of the W.A. State Committee of the (Australian) Council for Scientific and Industrial Research. He was twice President of the W.A. State Committee of the Australian Chemical Institute, on the latter of these occasions being also General President of the Council. When the Australian National Research Council was formed, he became an original Fellow and a member of the Executive Committee.

In his relations with his staff, Wilsmore was always friendly and generous. Former students held him in high regard. His standards were high and called for the close attention of those who came under his tuition, from which they received great benefit. After his retirement, students who had graduated in chemistry during his tenure of the Chair provided a fund, the proceeds of which are being used to provide an annual prize, known as the Wilsmore Prize, to be awarded to the most meritorious student of chemistry qualifying for graduation in each Session.

Wilsmore's death occurred after a short illness. He retained his activity practically unimpaired until a month before the end. He leaves a widow and one son.

G. TATTERSALL.